Turning them on, turning them off—how to control stem cells

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Scientists at the University of Bath have identified how a mutant gene in fish is involved in controlling stem cells.

A new study from the group of Professor Robert Kelsh in the Department of Biology & Biochemistry looks at how a novel group of stem cells are controlled by mutations in a gene called parade.

They identified a new set of stem cells in zebrafish, which eventually become skin pigment cells of different colours.

Populations of pigment stem cells are formed in the embryonic stages of development, but are then dormant and don't mature into a final cell type until adulthood. This development is controlled by a range of factors called the "stem cell niche—including surrounding cell types, blood supply and signals from nerves.

In parade mutants the zebrafish show large numbers of abnormally positioned pigment cells near the main blood vessels, lined up 'like soldiers on parade'.

The Bath team's work demonstrates that these pigment cells derive from this newly-discovered population of stem cells, which in the parade mutants become activated long before normal. Their research also showed that the key problem in parade mutant lies in the blood vessels, indicating that the blood vessels form a crucial part of the niche controlling this group of stem cells.

Prof. Kelsh said: "This is the first time that blood vessels have been shown to help control pigment stem cells, although they are a widespread feature of other stem cell niches. We expect that some of the factors controlling these pigment stem cells will be shared with other stem cell niches."

Karen Camargo-Sosa, the lead author whose Ph.D. thesis work contributed to this paper, added: "Our research has shown that the parade gene must regulate the signals controlling the division of adult pigment stem cells; this is the first time the parade gene has been implicated in stem cell regulation."

The group is now poised to explore how these features of the pigment stem cell niche control their behaviour, identifying which chemical signals from the blood vessels hold the stem cells in an inactive state, and which drive them to metamorphose—what turns them off, and what

turns them on.

More information: Karen Camargo-Sosa et al, Endothelin receptor Aa regulates proliferation and differentiation of Erb-dependent pigment progenitors in zebrafish, *PLOS Genetics* (2019). DOI: 10.1371/journal.pgen.1007941

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